

**In the claims:**

**Claims 7, 9, 17, 19, 27 and 29 of claims 1-34 are amended.**

**New claims 35-43 are added.**

1           1.       (Original)     A spin valve transistor comprising:  
2           an emitter;  
3           a collector;  
4           a base between the emitter and the collector;  
5           a spin valve including:  
6                 a ferromagnetic free layer structure;  
7                 a self-pinned antiparallel (AP) pinned layer structure; and  
8                 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
9           structure; and  
10          the base comprising at least said free layer structure.

1           2.       (Original)     A spin valve transistor as claimed in claim 1 wherein the base  
2           comprises the free layer structure, the self-pinned AP pinned layer structure and the spacer layer.

1           3.       (Withdrawn)   A spin valve transistor as claimed in claim 1 wherein the base  
2           comprises the free layer structure, the emitter comprises the AP pinned layer structure and the  
3           spacer layer is located between the base and emitter.

1           4.       (Original)     A spin valve transistor as claimed in claim 1 wherein the self pinned  
2           AP pinned layer structure comprises:  
3                 a ferromagnetic first antiparallel (AP) pinned layer;  
4                 a ferromagnetic second antiparallel (AP) pinned layer;  
5                 a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP  
6           pinned layers;  
7                 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a  
8           positive magnetostriction; and  
9                 the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to  
10          a head surface of the spin valve transistor for self pinning the AP pinned layer structure.

1           5.       (Withdrawn)   A spin valve transistor as claimed in claim 4 wherein the cobalt iron  
2 is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           6.       (Original)   A spin valve transistor as claimed in claim 4 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           7.       (Currently Amended)   A spin valve transistor ~~as claimed in claim 4~~ further  
2 comprising:

3           an emitter;

4           a collector;

5           a base between the emitter and the collector;

6           a spin valve including:

7               a ferromagnetic free layer structure composed of iron (Fe);

8               a self-pinned antiparallel (AP) pinned layer structure;

9               a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
10 structure; and

11               the free layer structure interfacing the spacer layer;

12 the base comprising at least said free layer structure;

13 the self pinned AP pinned layer structure including:

14               a ferromagnetic first antiparallel (AP) pinned layer;

15               a ferromagnetic second antiparallel (AP) pinned layer; and

16               a nonmagnetic antiparallel coupling (APC) layer located between the first and  
17 second AP pinned layers;

18 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;

19 the second AP pinned layer including:

20               an iron (Fe) film;

21               [[said]] a cobalt iron (CoFe) film[[:]] with a positive magnetostriction;

22               the iron (Fe) film being located between and interfacing the APC layer and the  
23 cobalt iron (CoFe) film; and

24               the CoFe film having a magnetostrictive anisotropy field that is oriented  
25 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
26 layer structure.

27               ~~the free layer structure being composed of iron (Fe) and interfacing the spacer layer.~~

1           8.       (Withdrawn) A spin valve transistor as claimed in claim 7 wherein the cobalt iron  
2 is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           9.       (Currently Amended) A spin valve transistor as claimed in claim [[8]] 7 wherein  
2 the cobalt iron (CoFe) film is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           10.      (Original) A spin valve transistor as claimed in claim 9 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           11.      (Withdrawn) A spin valve transistor as claimed in claim 4 further comprising:  
2 the second AP pinned layer being composed of iron (Fe);  
3 the first AP pinned layer including:  
4 first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer  
5 layer;  
6 said cobalt iron (CoFe) film; and  
7 the cobalt iron (CoFe) film being located between and interfacing the first and  
8 second iron (Fe) films.

1           12.      (Withdrawn) A spin valve transistor as claimed in claim 11 wherein the cobalt  
2 iron film is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           13.      (Withdrawn) A spin valve transistor as claimed in claim 12 wherein the cobalt  
2 iron film is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           14.      (Withdrawn) A spin valve transistor as claimed in claim 13 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           15.   (Original)    A magnetic head assembly comprising:  
2           a write head;  
3           a read head adjacent the write head;  
4           the read head including:  
5                 ferromagnetic first and second shield layers; and  
6                 a spin valve transistor located between the first and second shield layers;  
7           the spin valve transistor comprising:  
8                 an emitter;  
9                 a collector;  
10                a base between the emitter and the collector;  
11                a spin valve including:  
12                   a ferromagnetic free layer structure;  
13                   a self-pinned antiparallel (AP) pinned layer structure;  
14                   a nonmagnetic spacer layer between the free layer structure and the AP  
15                pinned layer structure; and  
16                the base comprising at least said free layer structure.

1           16.   (Original)    A magnetic head assembly as claimed in claim 15 wherein the self  
2           pinned AP pinned layer structure comprises:  
3                 a ferromagnetic first antiparallel (AP) pinned layer;  
4                 a ferromagnetic second antiparallel (AP) pinned layer;  
5                 a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP  
6                pinned layers;  
7                 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a  
8                positive magnetostriction; and  
9                 the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to  
10                a head surface of the spin valve transistor for self pinning the AP pinned layer structure.

1           17.   (Currently Amended)   A magnetic head assembly ~~as claimed in claim 16~~ further  
2 comprising:

3           a write head;

4           a read head adjacent the write head;

5           the read head including:

6                   ferromagnetic first and second shield layers; and

7                   a spin valve transistor located between the first and second shield layers;

8           the spin valve transistor comprising:

9                   an emitter;

10                  a collector;

11                  a base between the emitter and the collector;

12                  a spin valve including:

13                          a ferromagnetic free layer structure composed of iron (Fe);

14                          a self-pinned antiparallel (AP) pinned layer structure;

15                          a nonmagnetic spacer layer between the free layer structure and the AP  
16 pinned layer structure; and

17                          the free layer structure interfacing the spacer layer;

18                          the base comprising at least said free layer structure;

19           the self pinned AP pinned layer structure including:

20                          a ferromagnetic first antiparallel (AP) pinned layer;

21                          a ferromagnetic second antiparallel (AP) pinned layer; and

22                          a nonmagnetic antiparallel coupling (APC) layer located between the first and  
23 second AP pinned layers;

24           the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;

25           the second AP pinned layer including:

26                          an iron (Fe) film;

27                          [[said]] a cobalt iron (CoFe) film[[:]] with a positive magnetostriction;

28                          the iron (Fe) film being located between and interfacing the APC layer and the  
29 cobalt iron (CoFe) film; and

30                          the CoFe film having a magnetostrictive anisotropy field that is oriented  
31 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
32 layer structure.

33                          ~~the free layer structure being composed of iron (Fe) and interfacing the spacer layer.~~

1           18.     (Withdrawn)     A magnetic head assembly as claimed in claim 17 wherein the  
2 cobalt iron is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           19.     (Currently Amended)     A magnetic head assembly as claimed in claim ~~[[18]]~~ 17  
2 wherein the cobalt iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           20.     (Original)     A magnetic head assembly as claimed in claim 19 wherein the first  
2 and second AP pinned layers have the same magnetic thickness.

1           21.     (Withdrawn)     A magnetic head assembly as claimed in claim 16 further  
2 comprising:

3                 the second AP pinned layer being composed of iron (Fe);

4                 the first AP pinned layer including:

5                         first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer  
6 layer;

7                         said cobalt iron (CoFe) film; and

8                         the cobalt iron (CoFe) film being located between and interfacing the first and  
9 second iron (Fe) film.

1           22.     (Withdrawn)     A magnetic head assembly as claimed in claim 21 wherein the  
2 cobalt iron film is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           23.     (Withdrawn)     A magnetic head assembly as claimed in claim 22 wherein the cobalt  
2 iron film is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           24.     (Withdrawn)     A magnetic head assembly as claimed in claim 23 wherein the first  
2 and second AP pinned layers have the same magnetic thickness.

1           25.     (Original)     A magnetic disk drive comprising:  
2           at least one magnetic head assembly that has a head surface;  
3           the magnetic head assembly having a write head and a read head;  
4           the read head including:  
5                 ferromagnetic first and second shield layers; and  
6                 a spin valve transistor located between the first and second shield layers;  
7           the spin valve transistor comprising:  
8                 an emitter;  
9                 a collector;  
10           a base between the emitter and the collector;  
11           a spin valve including:  
12                 a ferromagnetic free layer structure;  
13                 a self-pinned antiparallel (AP) pinned layer structure;  
14                 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
15           structure; and  
16                 the base comprising at least said free layer structure;  
17           a housing;  
18           a magnetic medium supported in the housing;  
19           a support mounted in the housing for supporting the magnetic head assembly with said head  
20   surface facing the magnetic medium so that the magnetic head assembly is in a transducing  
21   relationship with the magnetic medium;  
22           a motor for moving the magnetic medium; and  
23           a processor connected to the magnetic head assembly and to the motor for exchanging  
24   signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1           26.     (Original)     A magnetic disk drive as claimed in claim 25 wherein the self pinned  
2   AP pinned layer structure comprises:  
3           a ferromagnetic first antiparallel (AP) pinned layer;  
4           a ferromagnetic second antiparallel (AP) pinned layer;  
5           a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP  
6   pinned layers;  
7           one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a  
8   positive magnetostriction; and  
9           the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to  
10   a head surface of the spin valve transistor for self pinning the AP pinned layer structure.

1           27.   (Currently Amended)   A magnetic disk drive ~~as claimed in claim 26~~ further  
2 comprising:  
3           at least one magnetic head assembly that has a head surface;  
4           the magnetic head assembly having a write head and a read head;  
5           the read head including:  
6                   ferromagnetic first and second shield layers; and  
7                   a spin valve transistor located between the first and second shield layers;  
8           the spin valve transistor comprising:  
9                   an emitter;  
10                  a collector;  
11                  a base between the emitter and the collector;  
12                  a spin valve including:  
13                          a ferromagnetic free layer structure composed of iron (Fe);  
14                          a self-pinned antiparallel (AP) pinned layer structure;  
15                          a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
16 structure; and  
17                          the free layer structure interfacing the spacer layer;  
18                  the base comprising at least said free layer structure;  
19                  the self pinned AP pinned layer structure including:  
20                          a ferromagnetic first antiparallel (AP) pinned layer;  
21                          a ferromagnetic second antiparallel (AP) pinned layer; and  
22                          a nonmagnetic antiparallel coupling (APC) layer located between the first and  
23 second AP pinned layers;  
24                  the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;  
25                  the second AP pinned layer including:  
26                          an iron (Fe) film~~[[;]]~~ with a positive magnetostriction;  
27                          ~~[[said]]~~ a cobalt iron (CoFe) film;  
28                          the iron (Fe) film being located between and interfacing the APC layer and the  
29 cobalt iron (CoFe) film; and  
30                          the CoFe film having a magnetostrictive anisotropy field that is oriented  
31 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
32 layer structure;  
33                  a housing;  
34                  a magnetic medium supported in the housing;



35 a support mounted in the housing for supporting the magnetic head assembly with said head  
36 surface facing the magnetic medium so that the magnetic head assembly is in a transducing  
37 relationship with the magnetic medium;

38 a motor for moving the magnetic medium; and

39 a processor connected to the magnetic head assembly and to the motor for exchanging  
40 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

41 ~~the free layer structure being composed of iron (Fe) and interfacing the spacer layer.~~

1 28. (Withdrawn) A magnetic disk drive as claimed in claim 27 wherein the cobalt  
2 iron is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1 29. (Currently Amended) A magnetic disk drive as claimed in claim [[28]] 27  
2 wherein the cobalt iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1 30. (Original) A magnetic disk drive as claimed in claim 29 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1 31. (Withdrawn) A magnetic disk drive as claimed in claim 26 further comprising:  
2 the second AP pinned layer being composed of iron (Fe);  
3 the first AP pinned layer including:

4 first and second iron (Fe) films with the first iron (Fe) layer film interfacing the  
5 spacer layer;

6 said cobalt iron (CoFe) film; and

7 the cobalt iron (CoFe) film being located between and interfacing the first and  
8 second iron (Fe) film.

1 32. (Withdrawn) A magnetic disk drive as claimed in claim 31 wherein the cobalt  
2 iron is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1 33. (Withdrawn) A magnetic disk drive as claimed in claim 32 wherein the cobalt  
2 iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1 34. (Withdrawn) A magnetic disk drive as claimed in claim 33 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           35.   (New)    A spin valve transistor as claimed in claim 9 wherein the base further  
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           36.   (New)    A spin valve transistor as claimed in claim 35 further comprising a barrier  
2 layer located between the emitter and the base for conducting hot electrodes from the emitter to the  
3 base wherein the hot electrons have an energy level above Fermi levels of the layers in said  
4 base.

1           37.   (New)    A spin valve transistor as claimed in claim 36 wherein the first and second  
2 AP pinned layers have the same magnetic thickness.

1           38.   (New)    A magnetic head assembly as claimed in claim 19 wherein the base further  
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           39.   (New)    A magnetic head assembly as claimed in claim 38 further comprising a  
2 barrier layer located between the emitter and the base for conducting hot electrodes from the  
3 emitter to the base wherein the hot electrons have an energy level above Fermi levels of the layers  
4 in said base.

1           40.   (New)    A magnetic head assembly as claimed in claim 39 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           41.   (New)    A magnetic disk drive as claimed in claim 29 wherein the base further  
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           42.   (New)    A magnetic disk drive as claimed in claim 41 further comprising a barrier  
2 layer located between the emitter and the base for conducting hot electrodes from the emitter to the  
3 base wherein the hot electrons have an energy level above Fermi levels of the layers in said  
4 base.

1           43.   (New)    A magnetic disk drive as claimed in claim 42 wherein the first and second  
2 AP pinned layers have the same magnetic thickness.